Remote Sensing and Signature Analysis

Ronald F. Tuttle
Ph.D, University of Missouri, Columbia, 1980

Associate Professor of Nuclear Engineering,
Department of Engineering Physics
(937) 255-3636 x4536
Ronald.Tuttle@afit.edu
http://en.afit.edu/enp/Faculty/tuttle.html

Dr. Tuttle's research centers on the development of remote sensing techniques for the collection, processing, and exploitation of electromagnetic radiation. Specific emphasis is given to signals below the visible part of the spectrum. Current emphasis includes MSI/HSI analysis, passive bistatics, non-cooperative target recognition, and applications of advanced architectures for data processing and analysis.

Glen P. Perram,
Ph.D., Air Force Institute of Technology, 1986

Professor of Physics,
Department of Engineering Physics
(937) 255-3636 x4504
Glen.Perram@afit.edu
http://en.afit.edu/enp/Faculty/perram.html

Professor Perram is an experimentalist with research interests in laser devices, remote sensing, chemical physics, spectroscopy, environmental science, and infrared systems. He primarily supports the development of high power chemical lasers, is currently the Director of the Center for Directed

Energy, and has published over 25 technical articles and reports

Research Areas

- Remote Sensing Technologies
- Signal and Image Processing, Characterization, and Integration
- Multispectral and Hyperspectral Imaging (MSI/HSI) Analysis
- Radiation Transfer Through the Atmosphere
- Passive Coherent Location (PCL)
- Modulation of the Environment
- Computational Processes of Large Data Sets

Recent and Ongoing Research

The above research areas support a new academic and research effort for Measurement and Signature Intelligence (MASINT). MASINT is technical intelligence information obtained by quantitative and qualitative analysis of data (any wavelength, time dependence, or modulation) derived from specific technical sensors, passive or active, for the purpose of identifying any distinctive features (signatures) associated with the detection and measurement of the emitter. Past research has involved Radiant Brass conventional munitions signatures and rocket plume detect, measurement, and characterization. Planned research involves MSI/HSI, error analysis and correction for sensor platform irregularities, non-cooperative target identification, co-channel interference characterization and mitigation, PCL exploitation of frequency-modulated signals, and novel computer architectures and processing algorithms for near-real time analysis of data streams from multiple sensor modalities such as SAR and hyperspectral radiometers.
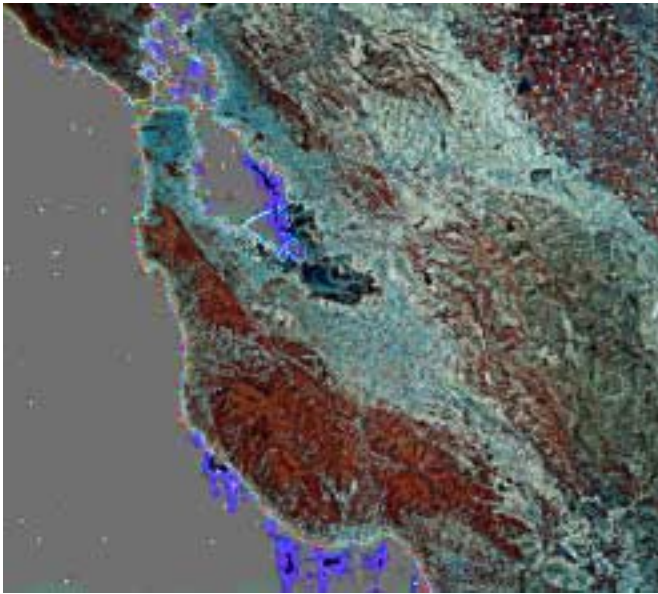
Landsat 5 data of San Francisco scanned in seven spectral bands.

Facilities

Numerous experimental and computational facilities are used for student research. These include a Remote Sensing Laboratory, a Satellite Simulation Facility, and Solid-State Device Fabrication Facility. The Remote Sensing Laboratory includes state-of-the-art spectrometers, radiometers, optical multichannel analyzers, and telescopes. Modeling facilities include in-house high-end personal computers for unclassified work. For large computational requirements and/or classified work, world-class, high-speed parallel processing systems are available at the National Air Intelligence Center. These systems allow development of algorithms for the integration and exploitation of data streams from multiple sensor modalities such as SAR and hyperspectral radiometers.

Won B. Roh
PhD, The Ohio State University, 1973

Professor of Engineering Physics,
Department of Engineering Physics
(937) 255-3636 x4509
Won.Roh@afit.edu

Dr. Roh's research interests span technology areas covering lasers, laser spectroscopy, and nonlinear optics. Specific application areas include laser phasing/energy scaling, phase conjugation, frequency conversion, and optical diagnostics. On the AFIT faculty since 1979, he holds a joint appointment with the Sensors Directorate, ARFL, has advised 5 Ph.D. and over 40 M.S. students and has published about 40 papers.